REMARKS

Claims 1-114 were pending prior to addition of newly presented Claims 115-133. Claims 69-114 are withdrawn pursuant to the Examiner's previous restriction requirement and are now canceled. Claims 1-68 are rejected. Claim 1 is amended for clarification.

Applicant thanks the Examiner for an informative and helpful discussion in the telephonic interview of February 27, 2002. In the telephonic interview, Applicant's Attorney pointed out that the prior art references Evans and Coveley each show a circuit which is designed to have a static current path during the "off" state, while Applicant's claimed circuit is designed to have no current path during the "off" state. Applicant's Attorney pointed out to the Examiner that the term "cut-off," as used in Claim 1 and Applicant's Specification, expresses this essential difference. (In Applicant's claimed circuit, any current drawn by the control circuit during the "off" state is minute and results entirely from the non-ideal nature of real circuit elements.) However, agreement was not reached because the Examiner understood the term "cut-off" to merely refer to the amount of current flow. The Examiner argued that pending Claim 1 is met by the cited references, which arguably show circuits with low currents. In the end, the Examiner agreed that a limitation, such as the "control circuit drawing no current during the off-state," would distinguish over both Evans and Coveley. The Examiner suggested that such a limitation could be introduced through a Request for Continued Examination, when a further search can be carried out.

Applicant substitutes the attached formal drawings of Figs. 3, 6a and 6b for the corresponding figures in the formal drawings filed October 18, 2001. The previously submitted formal drawings of Figs. 3 and 6b inadvertently failed to incorporate the corrections to the drawings submitted on March 29, 2000.

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Summary

The Examiner rejected the pending claims based on an erroneous understanding of the term "cut-off" in Applicant's claims. "Cut-off" represents a <u>circuit design</u> that requires no current in the "off" state under ideal conditions, rather than merely a quantitative description of a low current. Both prior art references on which the Examiner relied require static currents in the "off" state, as shown below.

Detailed Remarks

In the Final Office Action of January 29, 2001, the Examiner stated that the Declaration of Lloyd Ebisu submitted on October 18, 2001 is insufficient to overcome the rejection of Claims 1-68 based upon Coveley or Evans "because it does not seem to address the claimed subject matter":

> The claimed subject matter deals with the current drawn by the control circuit and not load in the off state. The declaration seems to be self-serving in that the maker of the switch performs the test. There is no indication of the item tested correlating to the claimed limitations. No estimates are provided regarding the closest references.

Applicant respectfully submits that the Examiner is in error. Claim 1, as it stood on October 18, 2001 clearly recites that the control circuit is connected in series with the load, so that the current in the load is an upper bound on the current in the control circuit (Kirchoff's current law):

> 1. (Amended) A solid state electrical switch for controlling a electrical load, comprising:
>
> a first terminal;
>
> a second terminal;
>
> <u>a semiconductor switch coupled by said first terminal and said second terminal to form with said electrical load a</u>

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series circuit across said AC power source, said semiconductor switch becoming conducting in response to receiving a control signal at a control terminal, said solid state electrical switch being in an "on" state when said semiconductor switch is conducting and in an "off" state when said semiconductor switch is not conducting; and

a control circuit providing said control signal, said control circuit being coupled to said first and second terminals in a parallel configuration with said semiconductor switch, wherein current in said control circuit is substantially cut-off in said "off" state.

Thus, contrary to the Examiner's statement, the current drawn by the load directly addresses the claimed subject matter. Further, contrary to the Examiner's assertion, currents drawn during the "off" state in the closest references were estimated to be 0.1 A (Coveley) and 8-20 mA (Evans) under 120 V AC conditions from the references themselves and specifically discussed in Applicant's Amendment of October 18, 2001:

> Specifically, in Coveley's disclosed circuit, a large leakage current passes through the load. For example, during the "off" state in Coveley power supply circuit 5 (i.e., solid state switch 1 in a non-conducting state), which is described at col. 4, lines 31-51, and shown in Figure 5, the line voltage appears across the circuit of capacitor C1, resistor R8 and zener diode D4. Since Coveley teaches that capacitor C1 is 1.5 uF, for a typical AC source of 120 volts at 60 Hz, an active current having an approximate amplitude 0.1 A would be drawn through the power supply circuit and the load shown at the negative half-wave. Similarly, Coveley teaches that the power supply circuit shown in Figure 6 which draws an active current through the load. Thus, Coveley's disclosed circuit does not behave as a solid state electrical switch with current cut-off in the "off" state.
>
> (Amendment of October 18, 2001, page 6)
>
> In fact, Evans teaches the conventional wisdom of providing a low voltage DC power supply circuit to support power control circuit 38:
>
> > C. There must always be enough power (Voltage X Current) available across the dc branch 28 to power the control logic 38, whether the triac 19 is off or on, but should not overload the logic circuitry.

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* * *

> ... However, it is understood, that whatever the voltage and power requirements of the control logic 38 they must be met by the dc power supply. The control logic 38 of the preferred embodiment operates on approximately 3 to 18 volts and approximately 200 microamps of current. ... Once the control logic 38 has the first time been activated, the control system 10 will continuously provide power through the parallel circuit 24 in sufficient values to operate the control logic 38 in both the conducting and non-conducting modes (triac-on and triac-off modes) of the triac 19 as explained below.
>
> (col. 6, lines 30-33; col. 9, lines 32-56)

> As a result, Evans's circuit is designed to have an active current in the "off" state at col. 11, lines 48-62:
>
> > Now, as the alternating current passing through the main terminals 20, 21 of the triac 19 drops below the holding current and the triac is turned off in its normal cyclical pattern, there is insufficient gate signal to turn the triac back on. Thus, the triac 19 remains in its non-conducting (triac-off) mode. In this state, substantially all of the voltage is again across the parallel circuit 24 thus providing sufficient power to the dc power supply and control logic 38. Although <u>current continues to flow through the parallel circuit 24 along lead wires 11 and 12 to the load 15</u>, the impedance across the parallel circuit 24 is so high, due to the presence in the circuit of resistor 32, that the resulting current flowing to the load is insignificant as compared to the current required to operate the load.
> >
> > (emphasis added)
>
> Although the total current in parallel circuit 24 is not known, the active current in parallel circuit 24 is at least 8-20 milliamps for 120-220 volt operations, estimating from the 15 K-ohm value of resistor 32, as disclosed in Evans's col. 8, line 5.
>
> (Amendment of October 18, 2001, pages 8-9)

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Applicant pointed out on page 14, last paragraph, that Mr. Ebisu tested a solid state electrical switch corresponding to Applicant's Claim 1. In his Declaration, Mr. Ebisu clearly states in paragraphs 7 and 9 that, in the "on" state of the solid state electrical switch, the load

draws 1.1 A current under a 120 V AC condition (i.e., an effective load of 120/1.1 = 109 ohms):

> 7. The test was conducted under 25°C and 47% relative humidity, using a 120 volts 60 Hz sine wave (as measured by the volt-meter) provided by the AC power source.
>
> * * *
>
> 9. Page 3 of the test report shows the voltage waveform across the test load, as displayed on the oscilloscope, when the solid state electrical switch was in the "on" state; the test load current was 1.1A, as measured by the current meter.

So that, when Mr. Ebisu states in paragraph 13 of his Declaration that the voltage drop across the load is less than 0.01 volts, it is clear that the current drawn in the control circuit according to Claim 1 is, respectively, 4 and 2 orders of magnitude (i.e., in the order of 10000 times and 100 times) less than those drawn by control circuits taught by Coveley and Evans:

> 13. From the waveforms on Pages 5-6 of the test report, I observed no visible (i.e., less than 0.01 volts) voltage drop across the test load for both the BA2 switch and the solid state electrical switch, indicating complete current cut-off in both the BA2 switch and the solid state electrical switch in the "off" state.

Mr. Ebisu's result also indicates that the solid state electrical switch of Applicant's Claim 1 has comparable performance as conventional mechanical-contact electrical switch, while the circuits of Coveley and Evans each draw a current 2-4 orders of magnitude greater than that drawn by the conventional mechanical-contact electrical switch. On that basis, the circuits of Coveley and Evans would not be properly considered an on/off switch, in the same sense as the conventional mechanical-contact switch.

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Applicant is not aware of any Patent Office rule or a directive in the MPEP that attaches any relevance to a Declaration that is deemed "self serving in that the maker of the switch performs the test." The Examiner is respectfully requested to explain the relevance,

and to what weight, the Examiner has accorded Mr. Ebisu's Declaration on account that it is "self-serving."

As explained below, the amendment to Claim 1 further clarifies that Applicant's claimed circuit distinguishes over the cited prior art based on the design of the control circuit. Thus Mr. Ebisu's Declaration is equally applicable to amended Claim 1.

In the Final Rejection of January 29, 2002, the Examiner repeated his previous rejections of Claims 1-68 variously under 35 U.S.C. §§ 102 and 103, based on the teachings of Coveley and Evans. In response to Applicant's arguments submitted on October 18, 2001, the Examiner states:

> It is to be noted that applicant tries to argue that the references cited by the examiner are not switches because of limitations not embraced by the claims. A switch provides an on/off function regardless of waveforms and the like, unless applicant desires to claim these extraneous features. The added claimed limitation to claim 1 is a relative term... substantially cut off in Coveley is addressed at the bottom of column 4 in that leakage can be reduced and column 5 addresses the elimination of leakage through the load, indicating a complete cut off as no load leakage mans that none is drawn by the control circuitry. Note that 1 is a solid state switch. In the case of Evans, the switch is solid state, i.e. 19. Column 9 addresses the use of 200 micro amps, which compared to an "on" current through the load, is substantially cut off. Column 11 addresses an insignificant current flowing through the load compared to operate the load. Thus it is substantially cut off. Thus the rejections hold. Regarding the taking of official notice, the applicant is demanding that the examiner produce references that teach the object of the taking in conjunction with a solid state electrical switch. If the examiner had such a combination, then anticipation would have been in order. The examiner took official notice that the details are well known, not that it is well known to have such in combination with a solid state electrical switch. The applicant admits on the record that some are known at page 12 of the response. Thus the examiner will produce references when the challenge is correct. The examiner did not confuse mechanical touch switches with what is claimed as many touch panels for dimmer control are capacitive. Again, references will be produced when the challenge is made of what

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> the examiner took official notice of. Coveley's R is used for the current detection in an overload current detector 3, not the protection itself. The detection 3 then controls 4 and solid state switch 1 per the material spanning columns 2-3. Regarding claim 4, a delay angle can include zero delay.

Applicant respectfully disagrees with the Examiner. First, Applicant believes that the Examiner incorrectly construed the term "cut-off," as taught in Applicant's Specification (e.g., at page 25, lines 6-33). As taught in Applicant's specification, "cut-off" is not a relative term, but describes the essence of the control circuit – that is, it is designed to have no current path in the "off" state. In contrast, Coveley's control circuit is not designed to operate in such a "cut-off" mode. For example, as shown in Figure 3, Coveley's zero crossing detector circuit 7 includes a static current path through resistors R3 and R4, drawing a current of 5/(3K+1K) = 1.25 mA. There are additionally other sources of static currents in Coveley. Coveley's zero crossing detector circuit 7 is a necessarily part in carrying out Coveley's control functions (Coveley, beginning at col. 1, line 65 to col. 2, line 5). This static current path is not diminished in anyway by Coveley's attempt to diminish the leakage current.

Similarly, in the "off" state, Evans show a current path through resistor 26, the diode between points 24b and E, resistor 32, resistor 31, the diode between points F and C and resistor 30. Thus, unlike the solid state electrical switch of Applicant's Claim 1 and as the Examiner points out, Evans teaches a control circuit that is designed to have a current path, and <u>by necessity</u> draws a current in the "off" state:

> <u>Although current continues to flow</u> through the parallel circuit 24 along lead wires 11 and 12 to the load 15, the impedance across the parallel circuit 24 is so high, due to the presence in the circuit of resistor 32, that the resulting current flowing to the load is insignificant as compared to the current required to operate the load.
>
> (Evans, at col. 11, lines 56-62)

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The values of resistors 26, 32, 31 and 30 are respectively 100Ω, 15KΩ, 47KΩ, and 27Ω (Evan's col. 8, lines 4-17). In the "off" state, as stated in Evan's col. 11, lines 53-56, substantially all of the voltage is across this current path. Thus, as Applicant points out on page 9 in the Amendment of October 18, 2001, with other currents in the control circuit, a current of 8-20 mA is drawn in the "off" state for 120-220 V operations. More importantly, such a current is in a current path that is designed to flow in Evans's circuit, and not merely a parasitic or leakage current due to non-ideal characteristics of physical circuit elements. Thus, Evans does not teach a control circuit that is designed to operate without a current path in the "off" mode. To more particularly point out this difference, Applicant has amended Claim 1 to recite:

> a control circuit providing said control signal, said control circuit being coupled to said first and second terminals in a parallel configuration with said semiconductor switch, wherein <u>said control circuit has no current path in said "off" state</u>.

Of course, as acknowledged by the Examiner during the telephonic interview, this language does not mean that a switch constructed from real circuit elements would have an identically zero current, as even high-quality mechanical-contact switches conduct a current in the micro-ampere range. Rather, it expresses that, <u>by design</u>, the control circuit has no current path, and no current would flow if the circuit elements were ideal. As amended, Applicant believes that Claim 1 is in allowable form.

With respect to the Examiner's taking official notice regarding various circuit elements (e.g., touch panels and gain, initialization, over-current protection, zero-crossing, audio and opto-coupling circuits), Applicant respectfully submits that the Examiner misses Applicant's arguments completely. To support his rejection, in addition to showing that the elements being combined are in the prior art, the Examiner must show that the prior art

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provides some suggestion or motivation to combine, and that the suggested or motivated combination has a reasonable likelihood to succeed, and not merely a suggestion to try. Here, the Examiner takes official notice merely of the circuit elements themselves, but provides from the prior art no support for any suggestion or motivation, or any teaching sufficient to enable -- with reasonable likelihood of success -- one skilled in the art to incorporate such circuit elements into the claimed solid state electrical switch. In particular, because Claims 7-18, 20-26, 31-32, 35-66, and 68 each depend from Claim 1, to meet the limitations in these claims, the Examiner must show that the combination is likely to result in a solid state electrical switch that has a control circuit with "no current path in said 'off' state" (as amended). Without specific teaching in the prior art that would sufficiently enable one skilled in the art to incorporate the circuit elements that the Examiner takes official notice into the claimed solid state electrical switch (e.g., such as taught by Applicant's Specification, at page 25, lines 11-29, for the gain circuits), the resulting combination is likely be one that includes a current path in the "off" state. Clearly, such a combination would not meet the limitations recited in these claims. Thus, the subject matter recited in Claims 7-18, 20-26, 31-32, 35-66, and 68 are not obvious, and the Examiner has failed to meet his burden of showing prima facie obviousness.

Regarding Claim 4, the Examiner is incorrect that the delay angle can include a zero delay angle. This is because Coveley teaches (e.g., at col. 2, lines 50-55) that its "[p]ower supply 5 receives charge during the portions of the AC power supply signal during which solid state switch 1 is non-conducting, and in response generates a regulated DC voltage for powering the control circuit 4, current overload detector 3 and zero crossing detector 7." Thus, a delay angle of zero, as suggested by the Examiner, will not allow power supply 5 to receive any charge for its operation and, consequently, Coveley's control circuit 4, current

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overload detector circuit 3 and zero crossing detector 7 fail. Thus, Coveley does not disclose or suggest Applicant's Claim 4.

Thus, for the above reasons, Applicant submits that Claims 1-68 are each allowable over Coveley and Evans, individually and in combination.

Newly presented Claims 115-133 each depend from Claim 1 and are also allowable over the prior art of record for reasons already explained above.

If the Examiner has any questions regarding the above, the Examiner is respectfully requested to telephone the undersigned Attorney for Applicants at 408-453-9200.

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Respectfully submitted,

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ATTACHMENT A
(Version with markings to show changes made)

Please amend Claim 1 as follows:

1. (Twice amended) A solid state electrical switch for controlling a electrical load, comprising:

a first terminal;

a second terminal;

a semiconductor switch coupled by said first terminal and said second terminal to form with said electrical load a series circuit across said AC power source, said semiconductor switch becoming conducting in response to receiving a control signal at a control terminal, said solid state electrical switch being in an "on" state when said semiconductor switch is conducting and in an "off" state when said semiconductor switch is not conducting; and

a control circuit providing said control signal, said control circuit being coupled to said first and second terminals in a parallel configuration with said semiconductor switch, wherein said <u>control circuit has no current path</u> [current in said control circuit is substantially cut-off] in said "off" state.

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